The Canadian Entomologist

VOL. LIX. ORILLIA, MAY, 1927. No. 6.

A BLACKFLY, (SIMULIUM BRACTEATUM), FATAL TO GOSLINGS.

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The attention of the writer was called, on July 8, 1926, to a small black fly which was present in large numbers on the bodies of goslings at the Dominion Experimental Station at Fredericton; at this time only two, and they were in poor condition, remained alive of an original flock of twenty seven. The blackfly was identified by Mr. C. H. Curran as *Simulium bracteatum* Coq.

When the birds were examined on July 8, most of the flies were found to be greatly distended with blood, very sluggish, and easy to catch. Others, which had, apparently, not been feeding so long, were very rapid in their movements and hard to capture. Those gorged with blood, when crushed between the fingers, left blood smears of about one-half an inch in diameter. As at least one hundred flies were present on each bird, the loss of blood must have been considerable and greatly weakening to birds so young; it appeared therefore highly probable that the flies were the cause of death.

The above mentioned flock of goslings was hatched on June 8th. The first death occurred on June 22. From that date on they died very rapidly, until on July 8 only two remained alive and these died within a few days. The date of the first appearance of the fly is indefinite, as the birds were not examined until the first death occurred at which time the presence of the insect was noted. For a number of days after hatching the goslings were doing exceptionally well and growing rapidly, so that the attack must have been very violent from its beginning in order to cause death so quickly. The flocks were watched carefully and the flies could be seen in swarms hovering over the birds, more especially during the evenings, until about August 5, when they disappeared.

An examination of ducks proved that the fly was also present on them in large numbers. The old ducks were in very poor flesh, but none of them died. The young ducks were also quite heavily infested, but as no more than a normal mortality occurred among them, the few deaths may have been from other causes.

In each case where a bird was examined, most of the flies were found to be infesting the breast and abdomen. Very few were found on the back and none on the head. The insect did not appear to attack man, or else preferred the birds, as one could walk among them and be immune to attack.

Enquiries made among a number of poultry raisers elicited the information that it was impossible to raise June geese or ducks unless there was water available. On one farm visited the young geese and ducks were sprayed every evening with "Cow-ease" to keep the flies away but in most cases the cause of the inability to raise June geese and ducks was not recognized. This trouble has, apparently, existed for years in certain areas of New Brunswick and, from information recently received, in Nova Scotia also.

NOTES ON INSECTS BRED FROM NATIVE AND CULTIVATED FRUIT TREES AND SHRUBS OF SOUTHERN MANITOBA.*

BY RALPH D. BIRD,
Treesbank, Manitoba.

An investigation of the insects living upon the fruit trees and shrubs growing in the neighbourhood of Treesbank, Man., was carried on during the summers of 1924, 1925 and 1926. The following list arranged by orders includes all the insects observed, with notes on their food plants and general time of occurrence in the adult stage, together with those species found already breeding on cultivated fruits.

I would like to acknowledge with pleasure my gratitude for many suggestions and much help received from Mr. Norman Criddle, Entomologist in charge of the Treesbank, Man. laboratory and in some cases for the use of his unpublished field notes. In all cases where the data were obtained by Mr. Criddle the fact is indicated by the initials (N.C.). I am also much indebted to Dr. J. McDunnough, Chief of the Division of Systematic Entomology, Ottawa, for the determination of any lepidoptera in doubt; to Professor J. R. Parker, Bozeman, Mont., for the identification of the Aphididae, and to Mr. J. J. de Gryse for the determination of the Coccidae.

LEPIDOPTERA

Nymphalidae

Polygonia progne Cram. Hosts, currant and gooseberry (N.C.). Adult occurs during July.

Hamadryas milberti Godt. Host, gooseberry (N.C.).

Basilarchia arthemis race *rubrofasciata* B. & McD. Host, *Prunus virginiana* L. Adult occurs during July.

Lycaenidae

Strymon liparops B. & L. Host, *Prunus virginiana* L. Adult occurs during July.

Lycaenopsis pseudargiolus argentata Fletch. Hosts, *Rubus idaeus* var. *aculeatissimus* Mey. Adult occurs during June.

Sphingidae

Sphinx drupiferarum S. & A. Hosts, apple, *Amelanchier spicata* Lam., *Prunus pumila* L., *P. virginiana* L., *P. pennsylvanica* L. (N.C.). Adults occur during June.

Darapsa pholus Cram. Host, *Viburnum opulus americanum* Mill. Adults occur during June.

Saturniidae

Samia cecropia L. Host, *Prunus pennsylvanica* L. (N.C.). Adult occurs during June.

Arctiidae

Hyphantria textor Harr. A general feeder on all fruit trees and many others. (N.C.). Adult occurs during June.

Noctuidae

Rhynchagrotis placida Grt. Hosts, *Amelanchier spicata* Lam., probably a general

*—Contribution from the Division of Field Crop and Garden Insects, Entomological Branch, Department of Agriculture, Ottawa.

feeder. Adult occurs during July.

Polia assimilis Morr. Host, *Prunus pumila* L. Adult occurs during June.

Conistra tristigmata Grt. Hosts, *Rubus idaeus* var. *aculeatissimus* Mey., *Prunus virginiana* L., *Amelanchier spicata* Lam. Adult occurs during September.

Acronicta furcifera Gn. Host, *Prunus virginiana* L. Adult occurs during June.

Acronicta impressa Wlk. Hosts, *Prunus virginiana* L., *Amelanchier spicata* Lam. Adults occur during late April and early May and in July. Parasite *Zenillia caesar* Ald.

Acronicta quadrata Grt. Host, *Prunus virginiana* L. Adult occurs during May and June.

Catocala manitoba Beut. Host, *Amelanchier spicata* Lam. Adult occurs during August.

Palthis angulalis Hbn. Host, *Prunus virginiana* L. Adult occurs during June.

Notodontidae

Schizura unicornis A. & S. Host, apple. Adult occurs during August or June.

Liparidae

Hemerocampa leucostigma A. & S. A general feeder on all fruit trees and many others. Adult occurs during August.

Lasiocampidae

Malacosoma fragilis St. Hosts, *Prunus pumila* L., *P. virginiana* L., *P. pennsylvanica* L., *Amelanchier spicata* Lam. (N.C.). Adult occurs during July.

Malacosoma disstria erosa St. A general feeder. Adult occurs in July.

Geometridae

Nemoria mimosaria Gn. Host, *Ribes idaeus* var. *aculeatissimus* Mey. Adult occurs during May.

Eupithecia ravocostaliata Pack. Host, *Prunus virginiana* L. Adult occurs during July.

Macaria denticulata Grt. Host, *Prunus virginiana* L. Adult occurs during July.

Itame ribearia Fitch. Hosts, currant, gooseberry, (N.C.). Adult occurs during July.

Plagodis keutzingi Grt. Host, *Prunus virginiana* L. Adult occurs during May.

Campaea perlata Gn. Host, *Prunus virginiana* L. Adult occurs during July.

Bapta semiclarata Walk. Host, *Prunus virginiana* L. Adult occurs during May.

Dysstroma hersiliata Gn. Host, gooseberry. Adult occurs during June.

Abbottana clemataria A. & S. Host, *Amelanchier spicata* Lam. Adult occurred during May.

Pyralidae

Desmia funeralis Hbn. Host, grape. Adult occurs during June.

Mineola tricolorella Grt. Host, *Prunus virginiana* L. Adult occurs during June.

Oecophoridae

Depressaria groteella Rob. Host, *Corylus*. Adult occurs during July.

Aegeriidae

Synanthedon exitiosa Say. Host, *Prunus pumila* L. Adult occurs during July.

Eucosmidae

Exartema versicoloranum Clem. Hosts, plum, *Prunus virginiana* L., *Amelanchier spicata* Lam., *Salix*. Adult occurs during June.

Sciaphila duplex Wlshm. Hosts, apple, *Prunus virginiana* L., probably a general feeder on all fruits and other trees. Adult occurs during July.

Eucosma canariana Kearf. Host, currant. Adult occurs during August.

Ancylis mediofasciana Clem. Hosts, *Amelanchier spicata* Lam., *Prunus pumila* L., probably a general feeder. Adult occurs during May.

Ancylis albacostana Kearf. Host, *Prunus pumila* L. Adult occurs during May.

Tortricidae

Pandemis canadana Kearf. Host, *Prunus pumila* L. Adult occurs during July.

Cacoecia conflictana Wlk. Host, *Populus tremuloides* L., but also attacks cherries and other fruits. Adult occurs during July. Parasites, *Itoplectus conquisitor* Say and *Zenillia caesar* Ald.

Cacoecia rosaceana Harr. Hosts, *Amelanchier spicata* Lam., *Prunus virginiana* L., *P. pennsylvanica* L., *P. nigra* Ait., *P. pumila* L., apple, raspberry, *Corylus*. Adult occurs during July. Parasites, *Microcentrus nigridorsus* Ashm., *Ictoplectus conquisitor* Say.

Cacoecia cerasivorana Fitch. Host, *Prunus virginiana* L. Adult occurs in August.

Cacoecia argyrospila Walk. Host, *Prunus virginiana* L. Adult occurs during July.

Tortrix pallorana Rob. Hosts, *Prunus pumila* L. *P. virginiana* L. Adult occurs during July. Parasite, *Zenillia caesar* Ald.

Peronea oxycoccana Pack. Host, *Prunus pumila* L. Adult occurs during September.

Yponomeutidae

Argyresthia oreasella Clem. Hosts, *Amelanchier spicata* Lam., *Prunus virginiana* L. (N.C.). Adult occurs during June and July.

Argyresthia freyella Wlshm. Host, *Prunus pennsylvanica* L. Adult occurs during June 9th.

Cameraria (*Lithocolletis*) *corylisella* Cham. Host, *Corylus americana* Walt. Adult occurs during May.

COLEOPTERA

Buprestidae

Dicerca divaricata Say. Hosts, *Prunus nigra* Ait., *P. virginiana* L. (N.C.). Adult occurs during June and July.

Chrysobothris mali Horn. Host, *Prunus virginiana* L. Adult occurs during June and July.

Dermestidae

Byturus unicolor Say. Host, raspberry. Adult occurs during May and June.

Cerambycidae

Ropolopus sanguinicollis Horn. Hosts, *Prunus pumila* L., *P. virginiana* L., *P. pennsylvanica* L. Adult occurs during June and July.

Psenocerus supernotatus Say. Hosts, currant, *Psedera quinquefolia* L., *Prunus virginiana* L. Adult occurs during May.

Hyperplatys aspersa Say. Host, *Prunus pennsylvanica* L. Adult occurs during June and July.

Saperda bipunctata Hopping. Hosts, *Amelanchier spicata* Lam., apple. Adult occurs during July.

Obera tripunctata Swed. Host, *Ribes idaeus* var. *aculeatissimus* Mey. Adult occurs during June and July.

Scarabaeidae

Dichelonyx subvittata Lv. Hosts, plum, (N.C.). Adult occurs during June.

Dichelonyx testacea Kby. Host, *Rubus* (N.C.). Adult occurs during June.

Chrysomelidae

Galerucella sp. Hosts, currant, gooseberry, (N.C.). Adult occurs in July.

Galerucella cavicollis Lec. Host, *Prunus pennsylvanica* L. Adult occurs during June and July.

Pachybrachys obsoletus Suff. Host, *Prunus pumila* L. (N.C.). Adult occurs during June to August.

Disonycha davisi Sch. Host, *Prunus pumila* L. Adult occurs during August.

Disonycha triangularis Say. Host, *Prunus pumila* L. Adult occurs during April to September.

Curculionidae

Brachyrhinus ovatus L. Host, strawberry (N.C.). Adult occurs during July to September.

Balaninus obtusus Blau. Host, *Corylus*. Adult occurs during July.

Tachypterellus quadrigibbus Say. Host, *Crataegus* sp. Adult occurs during June and July.

Anthonomus hirsutus Brun. Host, *Prunus virginiana* L.

Anthonomus scatellaria Lec. Host, *Prunus pumila* L. Adult occurs during June and July.

Conotrachelus nenuphar Hbst. Host, plum, also breeding in the black-knot on cherry, *Plowrightia morbosa*. Adult occurs during May and June and August.

Scolytidae

Pseudocryphalus criddlei Sw. Host, *Prunus virginiana* L. Adult occurs during August and September.

Phthorophlaeus liminaris Har. Hosts, *Prunus virginiana* L., *P. pennsylvanica* L. Adult occurs during August and September.

HYMENOPTERA

Super-Family TENTHREDINOIDEA

Tenthredinidae

Empria ignota? Nort. Host, strawberry. Adult occurs during May.

Trichiosoma confusum MacG. Host, *Prunus virginiana?* L. Adult occurs during May and June.

Trichiosoma triangularis Kby. Host, cherry (MacG. Hymen. of Connecticut). Adult occurs during June.

Hoplocampa halcyon Nort. Host, *Amelanchier spicata* Lam. Adult occurs during May and June.

Hoplocampa lacteipennis Roh. Host, *Prunus virginiana* L. Adult occurs during May and June.

Hoplocampa xantha Roh. Host, *Prunus virginiana* L. Adult occurs during May and June.

Monophadnoides rubi Harris. Host, *Rubus*. Adult occurs during May.
Pteronus ribesi Scopoli. Host, currant. Adult occurs during May to July.

DIPTERA

Cecidomyidae

Contarinia virginianiae Felt. Host, *Prunus virginiana* L. Adult occurs during May.
Cecidomyia sp. Host, *Amelanchier spicata* Lam. Adult occurs during May.

Trypanеidae

Epochra canadensis Loew. Host, currant, gooseberries. Adult occurs during May.
Rhagoletis cingulata Loew. Host, *Prunus pennsylvanica* L. Adult occurs during May.
Rhagoletis fausta Loew. Host, *Prunus pennsylvanica* L. (N.C.). Adult occurs during June (N.C.). Parasite, *Opius fuscipennis* Gahan, (N.C.).

HEMIPTERA

Pentatomidae

Banasa dimidiata Say. Sucks currant fruit.

Tingitidae

Corythucha pruni O. & D. Host, *Prunus virginiana* L. (N.C.).
Corythucha hewitti Drake. Host, *Corylus* (N.C.).
Corythucha cydoniae Fitch. Host, *Crataegus* sp. (N.C.).
Corythucha betulae Drake. Host, *Ribes* (N.C.).

Cicadellidae

Erythoneura comes var. *zigzac* Walsh. Hosts, *Psedera quinquefolia* L., grape.

Coccidae

Chionaspis furfura Fitch. Host, *Prunus virginiana* L. (E. Criddle).
Eulecanium sp. Host, *Prunus virginiana* L.

Aphididae

Anuraphis bakeri Cowen. Host, *Crataegus* sp.
Anuraphis crataegifoliae Fitch. Host, apple.
Hyalopterus arundinis Fab. Host, plum.
Myzus cerasi Fab. Host, *Prunus pennsylvanica* L.
Prociphilus alnifolia Williams. Host, *Amelanchier spicata* Lam.

FOUR NEW SPECIES OF ONTHOPHAGUS (COLEOPTERA).*

BY W. J. BROWN,
Ottawa, Ont.

Onthophagus oklahomensis n. sp.

Length 2.8-4 mm.; width 1.9-2.6 mm. Broadly oval; shining; black, the trophi, tibiae, and tarsi piceous; body with short brownish-yellow hairs.

Head slightly more than one-half as wide as the pronotum at middle; feebly or obsoletely bicarinate; with sparse, not coarse, hair-bearing punctures except on the carinal regions, vertex, and apical portion of clypeus; entire surface with very sparse, microscopic punctules. Clypeus feebly truncate at apex, the margin very feebly reflexed. Genae very obtuse, not at all prominent.

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*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

Pronotum about one-fourth wider than long; widest at middle; simply convex and without trace of protuberances in either sex; the base with a very fine, elevated marginal line. Pronotal surface microscopically alutaceous and with punctures of two sizes; the larger punctures rather coarse, sparse, and hair-bearing; the smaller punctures quite fine, sparse, and without hairs.

Elytra sometimes less shining than the pronotum; one-third wider than length of elytral suture; slightly wider than the prothorax; the sides moderately arcuate. Elytral striae fine; with well spaced, very inconspicuous punctures. Elytral intervals finely alutaceous; each with from one to three rows of fine, hair-bearing punctures.

Pygidium and metasternum with sparse, rather fine, hair-bearing punctures. Abdominal segments each with a row of fine punctures along base at middle, the punctures forming several confused rows at the sides. Middle and hind femora almost impunctate; the punctures few in number, fine, and subobsolete except near the apex of each where several are usually distinct. Anterior tibiae short and stout; alike in the sexes; the outer tibial margin quadridentate, the upper tooth very small.

Male. Carinae of head obsolete. Last abdominal segment broadly, arcuately emarginate at middle.

Female. Carina of vertex obsolete; clypeal carina usually distinct, sometimes obsolete. Last abdominal segment entire.

Holotype.— ♂, Payne Co., Oklahoma, April 26, 1925, (W. J. Brown); No. 2459 in the Canadian National Collection, Ottawa.

Allotype.— ♀, Payne Co., Oklahoma, April 15, 1925, (W. J. Brown); in the Canadian National Collection, Ottawa.

Paratypes.—FLORIDA: 2 ♂, 1 ♀; KANSAS: 3 ♂, 1 ♀, Medora, August, 28, 1925 (Knaus and Brown); NORTH CAROLINA: 11 ♂, 5 ♀, Southern Pines, June 2, 1925, (Mance); OKLAHOMA: 48 ♂, 43 ♀, Payne Co., (W. J. Brown), collected on various dates between April 5 and August 20, 1925 and 1926; 14 ♂, 6 ♀, Grady Co., June 11, 1926, (Brown); TEXAS: 4 ♀, Colorado Co., April 5, 1922, (Mrs. Grace Wiley).

Paratypes are deposited in the Canadian National Collection and in the collections of Mr. Warren Knaus and the University of Kansas.

O. oklahomensis has the form and facies of *O. pennsylvanicus* Harold and is confused with that species in collections. The unequal pronotal punctures of the former, however, serve to distinguish it from *pennsylvanicus*. In addition, *oklahomensis* is very distinctly shining, and the head is very feebly or obsoletely bicarinate in both sexes and is always without rugae. The secondary sexual characters are very feebly developed. In *pennsylvanicus*, the punctures of the pronotum are alike; the body is subopaque or feebly shining; the head usually bears distinct carinae and rugae except in well-developed males; and the middle and hind femora are very distinctly punctate. *O. oklahomensis* is the smallest of the North American species of *Onthophagus*.

The Oklahoma specimens of *oklahomensis* occurred in fresh manure on sand or on very sandy soil. With them occurred *pennsylvanicus, guatemalensis, hecate, tuberculifrons*, and scavenger beetles of other genera. It is probable that

oklahomensis occurs only in sand, as extensive collecting in localities where there is no sand failed to discover specimens.

Onthophagus knausi n. sp.

1924, *Onthophagus anthracinus* Dawson (not Harold), Univ. Studies, Lincoln, Neb., xxii, No. 344, p. 17.

Length 4.3-5 mm.; width 1.9-2.6 mm. Broadly oval; very feebly shining except the elytra which are opaque; black, the trophi, tibiae, and tarsi piceous; body with short, coarse, brownish hairs.

Head about two-thirds as wide as pronotum at middle. Clypeus broadly notched at apex, an obtuse tooth on each side of the notch.

Pronotum about one-fourth wider than long; widest at middle; the basal portion microscopically alutaceous; the base with a very fine, elevated marginal line. Pronotal puncturation rather coarse and very shallow; the punctures separated by distances less than their own diameters except on basal portion where they are less close; some of the punctures bearing hairs; the hair-bearing punctures larger than the others.

Elytra very slightly wider than the prothorax; one-fourth wider than length of elytral suture; the sides moderately arcuate. Elytral striae fine; with well spaced, fine punctures. Elytral intervals finely but very distinctly alutaceous; each with one or two rows of fine, hair-bearing punctures.

Pygidium opaque and finely alutaceous except at apex where it is smooth and shining; the surface with coarse, shallow, sparse punctures. Metasternum and femora with rather sparse, unequal punctures. Abdominal segments each with a row of punctures along base at middle, the punctures forming several confused rows at the sides. Anterior tibiae quadridentate; denticulate above and between the teeth.

Male. Head without carinae, rather finely and not closely punctate; clypeus with apical margin strongly reflexed and rather feebly notched; genae prominent. Pronotum with a short, stout, conical protuberance in front at middle. Anterior tibiae long, slender, and arcuate; the apex of each with a pencil of yellowish hairs. Last abdominal segment broadly, arcuately emarginate at middle.

Female. Head strongly bicarinate; clypeus roughly punctato-rugose; more deeply notched at apex, the tooth on each side reflexed; front and genae rather closely and coarsely punctate, the latter less prominnt. Pronotum without trace of protuberance. Anterior tibiae not elongate or arcuate and without pencils of hairs. Last abdominal segment entire.

Holotype.—♂, Morris Co., Kansas, August 25, 1922, (W. J. Brown); No. 2461 in the Canadian National Collection, Ottawa.

Allotype.—♀, Douglas Co., Kansas, August 15, 1921, (W. J. Brown); in the Canadian National Collection, Ottawa.

Paratypes.—KANSAS: 1 ♂, "Kan. T.B.A."; 1 ♂, 2 ♀, Douglas Co., April 22 and June 12, 1923, (Brown); NEBRASKA: 1 ♂, Omaha, June 12, 1914, (L. T. Williams).

Paratypes are deposited in the collections of Mr. Warren Knaus and Purdue University.

This species has many of the characters of *O. anthracinus* Harold and has been confused with that species in collections. In *knausi* the pronotum is very

closely punctate; in *anthracinus* the pronotal punctures are separated by distances greater than their own diameters. There is no indication of a prothoracic projection in the female of *knausi*.

Onthophagus cynomysi n. sp.

Length 6.3-10 mm.; width 3.5-5.4 mm. Broadly oval; entire surface strongly shining; piceous with a faint aeneous tint, the legs and thoracic venter sometimes fusco-testaceous; body with short brownish hairs. Head one-half as wide as the prothorax; clypeal margin feebly truncate at middle.

Pronotum about one-fourth wider than long; widest at middle; the base finely margined. Pronotal surface finely and sparsely granulate, each granule overhanging a hair-bearing puncture, the granules closer anteriorly; a few simple punctures evident near basal and lateral margins; median line almost smooth on basal two-thirds and depressed in basal third.

Elytra subequal in width to prothorax; one-fourth wider than length of elytral suture; the sides moderately arcuate. Elytral striae fine; with well-spaced, fine punctures. Elytral intervals except sutural with two irregular rows of fine granules, the sutural interval with a single row.

Pygidium sparsely, rather coarsely punctate. Metasternum very finely and sparsely punctulate at middle, sparsely and rather coarsely punctate on the sides. Middle and hind femora very finely and sparsely punctulate, each with a few coarse punctures. Abdominal segments each with a row of punctures along base at middle, the punctures forming several confused rows at the sides. Anterior tibiae quadridentate.

Male. Clypeus with apical margin strongly reflexed: finely rugose anteriorly, punctate posteriorly. Clypeal carina distinct but not strongly developed; carina of vertex broadly interrupted at middle, elevated on each side into an acute tubercle. Front finely and sparsely punctate, the punctures becoming obsolete on the vertex. Genae more coarsely punctate, very prominnt. Pronotum with a roughly punctured process in front; the process broad, elongate, and very deeply, arcuately emarginate at middle. Anterior tibiae long, slender, and denticulate above and between the teeth. Last abdominal segment broadly, arcuately emarginate at middle. Poorly developed males with head strongly bicarinate; tubercles of vertex feeble or obsolete; genae less prominent; pronotal process much shorter and more or less feebly emarginate.

Female. Clypeus with apical margin less strongly reflexed; coarsely rugose throughout. Head simply and very strongly bicarinate, without tubercles. Front more coarsely punctate; vertex almost impunctate. Genae less prominent. Pronotal process broad, short, feebly emarginate. Anterior tibiae short and stout, their outer margins denticulate at base. Last abdominal segment entire.

Holotype.—♂, 101 Ranch, Noble Co., Okla., June 29,, 1926, (W. J. Brown); No. 2471 in the Canadian National Collection, Ottawa.

Allotype.—♀, same data, in the Canadian National Collection, Ottawa.

Paratypes.—14 ♂, 15 ♀, 101 Ranch and Otoe Pasture, Noble Co., Okla., June 21 and 29, 1926, (G. A. Bieberdorf and W. J. Brown).

Paratypes are deposited in the Canadian National Collection and in the collection of Mr. Warren Knaus.

An individual of this species resembles a large, dark specimen of *O. orpheus* Panzer. The secondary sexual characters of the two are almost exactly alike. The sculpture of *orpheus*, however, is punctate and not granulate. *O. cynomysi* differs from *subaeneus* and *guatemalensis*, the granulate species it most closely resembles, in being larger, darker in color, more sparsely granulate, and in possessing the secondary sexual characters of *orpheus*.

O. cynomysi occurs in the burrows of the common prairie dog.

Onthophagus cochisus n. sp.

Length 9 mm.; width 5.5 mm. Broadly oval; body largely opaque above, ventral surface of thorax and legs shining; black; pronotum and elytra with very short, stout, sparse, brown setae; anterior half of ventral surface sparsely hairy. Head slightly more than one-half as wide as prothorax; genae not prominent.

Pronotum about one-fourth wider than long; widest at middle; the base finely margined. Pronotal surface finely alutaceous; coarsely, rather closely punctate, the punctures becoming sparse near anterior margin and hind angles; median line very feebly depressed on basal third.

Elytra subequal in width to prothorax; about one-fourth wider than length of elytral suture, the sides feebly arcuate. Elytral striae fine, with well spaced fine punctures. Elytral intervals finely alutaceous, each except sutural with three or four rows of fine, shining granules, the sutural interval with two rather incomplete rows of such granules.

Pygidium alutaceous; finely, sparsely punctate. Metasternum sparsely punctate; the punctures fine at middle, coarse on the sides. Middle and hind femora with very sparse intermixed coarse and fine punctures. Abdomen alutaceous, the segments almost impunctate at middle, moderately punctured on the sides. Anterior tibiae quadridentate.

Male. Head except vertex coarsely, closely punctate, feebly shining. Clypeus subrectangular, the front angles obtuse, anterior margin feebly rounded and broadly reflexed; without trace of carina. Vertex with strong, arcuate carina; alutaceous, rather sparsely punctate. Pronotum feebly shining in anterior third; broadly and feebly produced in front, the anterior face of the process vertical; surface on each side of procees excavated into a shallow concavity, the posterior margin of each concavity with a short, obtuse tubercle; median line of pronotum impunctate on basal half; lateral pronotal margin obtusely angulate one-third from apex, the angle reflexed, the margin oblique to front angle. Anterior tibiae slender, strongly arcuate in apical third, denticulate above and between the teeth, the upper tooth very small, the spur strongly curved. Last abdominal segment broadly, arcuately emarginate at middle.

Female. Entire dorsal surface opaque. Clypeus feebly truncate in front, the sides oblique; surface rather coarsely rugose. Head simply and strongly bicarinate, the carinae moderately arcuate; intercarinal area coarsely, rather closely punctate; vertex alutaceous, finely, sparsely punctured. Pronotum with a very feeble indication of process in front, not excavated or tuberculate laterally, the angle of lateral margin obsolete, the median line punctate throughout. Anterior tibia stout, not arcuate near apex, denticulate above the upper tooth which is less reduced; the spur moderately curved. Last abdominal segment entire.

Holotype.— ♂, Pinery Canyon, Chiricahua Mountains, Cochise Co., Arizona, 5500 ft. (Witmer Stone); in the collection of the Philadelphia Academy of Natural Sciences.

Allotype.— ♀, same data, in the collection of the Philadelphia Academy of Natural Sciences.

The male of this very distinct species resembles the male of *janus* in pronotal sexual characters. It differs from other opaque, black species of the North American fauna in possessing a punctured pronotum in combination with granulate elytra; it is also larger in size and possesses sexual characters of a different type.

THE LIFE HISTORY AND HABITS OF A MAYFLY FROM UTAH.

BY JAMES G. NEEDHAM,
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While collecting at Birch Glen in Logan Canon, Utah, on June 18th, 1926, I first came upon the nymph of the mayfly (*Rhithrogena mimus* Eat.) that is the subject of this article. I was gathering aquatic insects from among the larger stones in a swift portion of the river. Dipterous larvae of Simulium and Bibiocephala were common, and the nymphs of the big mayfly *Ephemerella doddsi* (locally called the "ginger quill") were appearing on my hand screen, when along with them appeared a few peculiar mayfly nymphs with broadly expanded gills of a bright rose-red color. I quickly got some of them into a rearing cage and in a few days had sub-imagos, and later adult reared specimens, of the species described below.

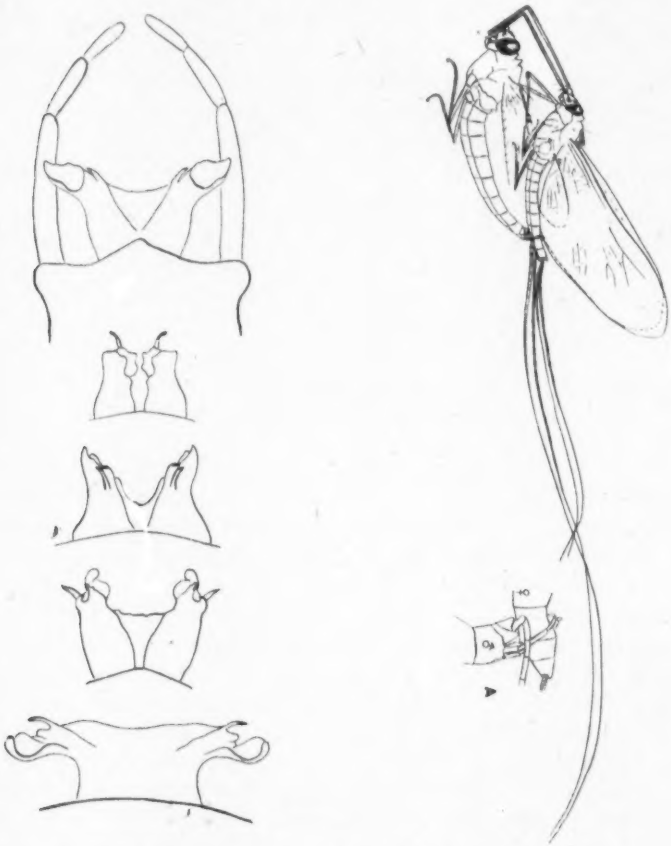
The first adults seen at large were flying over the river at nightfall on June 20th. They were then few. The next night there were more of them out, and two days later they were flying by thousands in an elongated swarm that extended up stream and down over the middle of the river. I could reach but few of them from the bank with an ordinary net, so I fastened my net to a long cane pole and, going to a narrows, found that I could then sweep them into it, a dozen or more at a stroke.

The swarm consisted of hovering males that flew about irregularly like midges or syrphus flies; not up and down with the regularity of so many other mayflies, but in and out, with their wings going when descending as well as when ascending. They kept to midstream, well down within the green lane formed by bordering trees.

Then I began looking for females. With thousands of males flying before me, a copulating pair (recognizable in the gathering dusk by larger size and slower flight) would be seen at intervals of a minute or two, and I would sweep it out of the swarm. These had to be taken quickly when seen for they soon would leave the swarm.

These pairs do not separate so quickly as do all other kinds of mayflies that I have taken when mating. Many of them were still attached when found in the net, and one pair was still attached when killed in the cyanide bottle. This pair I mounted so in balsam later. It is the basis of the accompanying figure. Thus

I have been able to settle to my satisfaction the hitherto doubtful question of the copulatory position of the male. The true position is as here shown.



Only in flight is copulation possible. The male flies up underneath the female, throws his elongated fore legs up over her thorax, flexing them at the swivel-like knee joint, and catching his claws somewhere on her back between the wing-roots. With the tip of his abdomen turned sharply forward, and the tip of the penes thus directed upward, he grasps the tip of the abdomen with his forceps somewhere behind the genital opening; and thus it is easy to see how the genital orifices of the pair are brought into apposition.*

Flying through these mayfly swarms were a number of other insects that were emerging from the river at nightfall, going shoreward. Commonest of

*—The position of a pair shown for *Chlocon dipterum* in Bernhard's figure 1 on page 468 of *Biologisches Centralblatt* for 1907 (Vol. 27) with the male inverted in position seems quite impossible; for in that position his forceps would clasp the abdomen of the female in front of the genital opening, compressing the oviducts and preventing ingress of the sperm mass. This figure is copied by Ulmer in Schultz's *Biologie der Thiere Deutschlands* Part 34, p. 9.

these were other larger mayflies (*Drunella grandis*), pale little stoneflies (*Alloperla pallidula*) and several species of midges (Chironomidae).

Large swarms continued to fly at nightfall until the 28th of June and smaller ones scatteringly well into the month of July. During all this time I was living by the river, collecting daily along its shores; yet outside these nightly swarms I saw only one specimen of this species at large. It was a male that I found in mid afternoon, sitting on a weed stem on the shore two feet from the edge of the water.

Nor did I find the nymphs in the stream in any such abundance as these swarms would lead one to expect. They were fairly common in the swifter waters only. Possessed of an admirable sucking disc they are able to cling to the smooth surface of current-swept stones. Doubtless they forage there upon the slime-coat algae that grow on such surfaces, and there meet with but few competitors.

The characters of the adult are set forth in the original description by Eaton (Monogr. Ephem. p. 249) and by McDunnough in the Canadian Entomologist 56: 13, 1924, Pl. 3 fig. 7. The form of the genitalia is as shown in the accompanying figures, from which it may be judged that the penes present remarkable differences in appearance according to the position of their parts. I am publishing figures of the nymph in a forthcoming bulletin of the Utah Agricultural Experiment station, but without description, owing to the nature of that bulletin.

The nymph measures in length of body 9 mm., with tails 7 or 8 mm. additional.

The body is very smooth, nearly concolorous greenish brown, only a little darker on the head, the mid-thorax, the wings, and the apex of the abdomen. The antennae are pale beyond the brown basal segment.

Prothorax pale greenish brown. Mesothorax darker, with a narrow blackish line across the front, an obscure paler median stripe, and some pale curved marking about the wing roots. Legs pale; femora darker on the dorsal side, the darker color divided by a pale V-mark opening outward (toward the knee). The carinate margins of all the leg segments are narrowly lined with brown, and the rear of the femora fringed with soft brown hairs.

The abdomen is darker dorsally toward the tip, pale beneath, and the tails are very pale. The gill plates are of a bright rose-pink tint in their thicker parts, with transparent margins. By the overlapping of their expanded margins they form the margin of a complete oval sucking disc beneath the abdomen. Those of the very large first pair meet together closely beneath the metathorax. Those of the last (7th) pair loosely overlap beneath the tip of the abdomen. Those of the five intermediate pairs have thin transparent outer margins, and, bear rounded, earlike, erect lobes singly on the thicker inner margin. The filamentous gills arise in pedicellate tufts on the dorsal side at the base of the gill plate.

This is a remarkably beautiful mayfly nymph, by reason of its rose-tinted gills. It is still more remarkable for the perfection of its attachment disc, produced by adaptations of the gills.

No satisfactory characters for distinguishing *Cinygma* from *Rhithrogena*

have ever been proposed. The nymph is so nearly identical with the typical *Rhithrogena* that I propose to abandon the name *Cinygma* altogether.

NEW COLEOPTERA XII.

BY H. C. FALL,
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Coelambus dentiger n. sp.

Elongate oval, very nearly twice as long as wide, outline nearly continuous. Body above and legs dull yellow, beneath black. Head with a diffuse oblique fuscous spot each side; thorax with a small post-median discal spot and the front and rear margins narrowly infuscate at middle; elytra each with four indicated fuscous vittae which are usually largely confluent; body above and beneath shining in both sexes, the ventral segments inclining to be feebly alutaceous in the female. Front tarsi of male rather strongly dilated, basal two joints equal and evidently wider than the third, claws strongly curved, equal, stouter than in the female, the anterior one with a stout basal tooth.

Length 5 to 5.6 mm.; width 2.6 to 2.8 mm. The largest specimens are males, the smallest, females.

This species is described from a series of ten examples taken at Medicine Hat, Alberta, by Mr. F. S. Carr, to whom I am indebted for my series. The type (♂) bears date May 24th, 1923.

Closely related and very similar to *oregonus* in size and form, but is a little more shining and with slightly finer punctation, the series of coarser punctures on the elytra a little better marked though still fine. The front claws of the male in *oregonus* are a little shorter than in the present species, and the anterior one is devoid of the basal tooth..

Coelambus infuscatus Sharp

I am referring to this species a series of four examples collected by Mr. M. C. Lane at Ritzville and Kahlotus in Eastern Washington. They are very close indeed to *C. dentiger* above described, being of similar size and form, and identical in the broad tarsi with subbasally dentate anterior protarsal claw of the male. The elytral vittae are however almost completely fused, leaving only the suture narrowly pale in basal half, and occasionally faint traces of separation of the vittae near the base. The coxal plates are distinctly strigillato-reticulate between the punctures, these areas being without trace of such sculpture in *dentiger* and *oregonus*. The elytral punctation is sensibly uniform throughout except for the rows of coarser punctures and is rather denser than in *dentiger*.

Sharp's description of *infuscatus* is very short and was drawn from two female examples, one shining the other dull. It is by no means certain that this is really the thing he had in hand, but the description fits well enough so far as it goes, and the locality named by Sharp—Nevada—does not make the reference unreasonable. The length varies from 5 to 5.5 mm., and is 5 mm. for *infuscatus* by Sharp's description.

Pteroloma tahoeca n. sp.

Brown to piceous, the sides of the thorax broadly but diffusely paler, the legs and antennae brownish testaceous. Antennae as in the allied species. Head one-half as wide as the thorax in the female, relatively a little wider in the male.

Thorax fully three-fourths (♂) to nearly twice (♀) wider than long, sides arcuately convergent in front, straighter and only slightly converging posteriorly, not evidently sinuate before the hind angles, which are almost rectangular; sides of pronotum rather broadly explanate, surface minutely alutaceous and very sparsely finely punctate. Elytra rather broadly oblong oval, moderately attenuate behind, about one-third wider than the thorax, widest at the middle; striae finely impressed, closely finely punctate; intervals nearly flat, minutely alutaceous but somewhat shining, alternate ones with a series of distant very fine and inconspicuous punctures. Length 4.6 to 5.8 mm., width 2.75 to 3 mm. Described from four examples from Lake Tahoe, California (3 ♀s E. A. Schwarz and J. O. Martin), and Tuolumne Meadows, Calif. (1 ♂, G. R. Pilate).

This species is very similar in most respects to *caraboides*, differing chiefly in its much wider thorax, which is less narrowed behind and more nearly equal in width to the elytra at base. In *caraboides* the thorax is only two-fifths to one-half wider than long and the size is appreciably larger (6½-7 mm.). The pro- and mesotarsi are dilated in the male precisely as described of *caraboides*. The type is a Lake Tahoe female collected by Mr. Martin, Aug. 20, 1922.

Aphodius gravis n. sp.

Oblong, slightly broader behind, black, shining, glabrous. Antennae piceous. Head not tuberculate, closely rather finely punctate, becoming subrugose in front; frontal suture fine, lightly impressed, becoming feebly cariniform laterally; clypeus emarginate at middle, the margination limited each side by a small but distinct dentiform prominence. Prothorax one half wider than long, widest a little before the middle, sides feebly convergent and faintly sinuate posteriorly, hind angles obtuse but defined as viewed from the side, what appear to be the hind angles as viewed from above, broadly rounded; basal marginal line distinct and entire; disk rather sparsely punctate with coarse and fine punctures intermixed. Elytra at base as wide as the thorax, humeral angles finely dentiform, sides slightly divergent to behind the middle; striae moderate, finely punctured; intervals a little convex at sides, nearly flat on the disk, punctures sparse, very fine and irregularly disposed. Body beneath in great part finely rugosely punctate and dull, the metasternum smoother and more distantly punctured posteriorly and at middle; mesosternum densely rugose in front, feebly to scarcely carinate between the coxae. Margin of anterior tibiae crenulate above, the face with a few punctures near the base. Posterior femora sparsely irregularly punctate, a few coarse punctures serially arranged in a feeble erosion near the knee; basal joint of hind tarsi distinctly longer than the next three.

Length 8.5 to 9 mm., width 4.3 to 4.5 mm.

Described from two examples, sex not evident, collected and given me by Mr. J. O. Martin, who took them at Norval Flats, Lassen Co., California, July 3, 1920, elevation 5500 ft.

This remarkably fine species must apparently be referred to Horn's group "G" as at present characterized. Both thorax and elytra are somewhat narrowed toward the base, but the elytra cannot fairly be called oval, as they are in *nevadensis* and *gentilis*, and the metasternum which is there and also in *cribratus* much abbreviated behind the middle coxae with corresponding deficiency in wing develop-

ment, is in the present species of normal length.

This fact together with the much greater size will at once distinguish *gravis* from the other species of this group.

Metachroma opacipenne n. sp.

Oblong, moderately elongate; head, thorax, antennae and legs entirely rufotestaceous; elytra rufotestaceous with the suture narrowly blackish, and each with two small median black spots, one at about the basal fourth, the other near the middle of the length. Head and thorax highly polished, elytra alutaceous and opaque. Head very finely sparsely punctate on the front, the punctures sparse but less fine on the clypeus, closer and coarser on the occiput; clypeo-frontal suture not grooved. Prothorax ¾ as long as wide, scarcely narrowed in front, sides evenly rounded, angles prominent, surface distinctly but not densely punctate, the punctures separated by from one to two times their own diameters, finer and sparser near the margins, a narrow impunctate median line. Elytra nearly ½ longer than wide, striae all regular and distinctly impressed, punctures rather coarse toward the base, gradually finer apically; intervals somewhat convex on the disk, becoming more strongly so at sides, extremely minutely sparsely punctulate. Propleura impunctate, abdomen sparsely punctate, metasternum not visible.

Length 4.3 mm., width 2.5 mm.

Santa Rosa, Lower California, a single specimen. By Horn's table this species would fall near *ustum*. This latter species, according to Horn, has the head at most absolutely smooth, and the thoracic punctures fine, sparse and indistinct. The sharp contrast between the shining thorax and opaque elytra in *opacipenne* does not obtain in any of the allied species.

Metachroma coronadense n. sp.

Oblong oval, rufotestaceous, marginal bead of prothorax, scutellum and elytral suture blackish. Entire upper surface shining, not alutaceous at any point. Antennae and legs entirely rufotestaceous, body beneath black. Head including clypeus finely sparsely punctulate, clypeo-frontal suture not excavated. Prothorax slightly more than ⅓ width than long, not narrowed in front, sides evenly arcuate, angles prominent, surface very finely sparsely punctate, median line impunctate.

Elytra 3|10 wider and 7|10 longer than the thorax, ⅓ longer than wide; striae all regular and rather coarsely punctate somewhat smaller though still strong at apex; intervals nearly flat except near the sides, very sparsely, minutely, scarcely detectably punctulate. Propleura smooth, metasternum and ventral segments sparsely punctate. Tooth of hind femur extremely small.

Length 3.3 mm.; width 1.8 mm.

Described from a single example taken at Coronado, California, and bearing date 4-19-91.

This species like the preceding goes to *ustum* by Horn's table but is much smaller and differs by its more close set strial punctures which are relatively coarser at apex, and by the punctured metasternum.

Metachroma anaemicum n. sp.

Form short and stout, nearly as in *pellucidum* and *testacea*. Color pale yellowish testaceous throughout, surface above everywhere strongly shining, rarely with trace of alutaceous sculpture on the pronotum. Head nearly smooth on the

front, becoming visibly punctate on the clypeus and occiput; clypeo-frontal groove deeply impressed. Prothorax from ½ wider to twice as wide as long, sides strongly evenly rounded, angles prominent; surface typically rather coarsely, deeply, closely punctate, the punctures separated by their own diameters or less, becoming a little smaller and sparser near the margins. Elytra less than ⅓ longer than wide, strial punctures becoming fine and faint at sides and apex, all striae regular, intervals sparsely almost invisibly punctulate. Body beneath alutaceous, metasternum nearly impunctate, abdomen sparsely punctured.

Length 2.3 to 2.7 mm.

This little pale yellow species of robust form is quite common in the Florida peninsula. My series contains specimens from St. Augustine, Ormond, West Palm Beach, Enterprise, Dunedin and St. Petersburg.

Type locality—West Palm Beach.

There is a single example of this species from Georgia in the LeConte collection, bearing the Zimmermann Manuscript name *brevicolle* in Crotch's hand. This specimen if my memory serves me was placed with *pellucidum* by Crotch, and as such it doubtless stands in most collections. It is very close to *pellucidum* in most respects, but the type of the latter as well as all specimens in my own series have the thorax darker red, contrasting conspicuously with the paler elytra; the thoracic punctation is also typically much finer and sparser and less evenly disposed, the punctures being fewer and finer along the median line, not at all so in *anaemicum;* the size is also a little larger than in *anaemicum*. Crotch's type (*pellucidum* Zimm. M.S.), was from North Carolina. My own specimens are from New Jersey, Arkansas and Louisiana; I do not know whether it occurs in Florida.

Monachulus viridanus n. sp.

Size of *affinis* but a little less robust; body above and metasternum dark bronzed green, propleura and ventral segments deep blue, legs green varied with blue; antennae piceous, basal five joints pale. Upper surface throughout alutaceous but somewhat shining. Prothorax sparsely and finely but distinctly punctate, the punctures becoming coarser toward the base; before each hind angle an oblique impression having two coarse punctures at bottom. Elytra punctate striate as usual.

Length 2.2 mm., width 1.35 mm.

St. Peterburg, Florida. A single male specimen taken by the writer March 28, 1923.

This species is unique among those at present known from our fauna by its bronzed green color which is closely similar to that in many specimens of *Diachus auratus*. The punctation of the thorax is also conspicuously stronger than in any other of our Eastern species of the genus. The size is notably smaller than in *ater* and *saponatus* and about the same as in *affinis*, from which aside from color and thoracic punctation, it differs by the much less close approximation of the eyes on the vertex in the male.

Monachulus affinis Hald.

This name takes page precedence over *auritus* and should therefore be the name of the species and *auritus* the varietal name. They are thus labeled in the

collection of LeConte, who had Haldeman's types, but the names have been reversed in both the Henshaw and Leng Lists. Following Crotch, *auritus* is said to be the male and *affinis* the female, but this distinction does not hold in my series, in which there are present both sexes of the *affinis* form with entirely black thorax.

Glyptina maritima n. sp.

Elongate oval, moderately convex, pale yellowish testaceous, beneath either concolorous or somewhat darker. Antennae entirely pale, about half the length of the body, fourth joint slightly longer than the second. Head smooth. Prothorax one half wider than long, front angles obliquely truncate with post-apical angulation, sides thence feebly arcuate and perceptibly diverging to base; surface shining, minutely alutaceous between the fine punctures, which show a tendency to become longitudinally elongate, especially on the disk, and which are separated from each other by about their own diameters. Elytra suboval, humeri not very prominent, striae lightly impressed and nearly evenly punctate throughout; wings well developed. Abdomen sparsely punctate. Length 1.8-2.5 mm.

Described from six examples, 5 from Hyannis, Mass., Aug. 1904, collected by Mr. Frederick Blanchard, and 1 from Marion, Mass., taken by the writer Aug. 9-12, 1902. The type is a male from Hyannis.

By Horn's table this species would fall near *spuria* and the recently described *abbreviata* of Gentner, both of which species are considerably smaller, normally brownish to piceous beneath, sides of thorax nearly or quite parallel behind the post-apical angulation, 2nd and 4th antennal joints virtually equal. The sculpture of the thorax as above described is not closely approached in any specimens of *spuria* or *abbreviata* in my series. *Maritima* is probably restricted to the vicinity of the shore line.

Apion speculiferum n. sp.

Belongs to Group I, near *erraticum* and *impeditum*. Form narrow, subparallel, moderately convex, black throughout with a grayish aspect due to the well developed ashy pubescence. Beak (♂) moderately curved, a little shorter than the head and thorax, finely strigose basally, punctate beyond the dilatation, smooth and shining for a short distance at apex; in the ♀ similarly curved and scultured but fully as long as the head and thorax. Front as wide as the beak at apex, canaliculose. Eyes not prominent. First antennal joint (♂) not as long as the next two and nearly reaching the eye, in the ♀ as long as the two following and reaching the eye. Prothorax as long as wide, sides almost parallel, very feebly arcuate at middle, apex only very slightly narrower than the base, surface rather densely punctate, dorsal impressed line distinct, not entire. Elytra narrow, parallel, not quite three-fifths as wide as long, humeri small but evident; intervals flat, a little less than twice as wide as the striae, finely irregularly punctate. Metasternum and ventral segments coarsely punctate, the punctures separated by their own diameters or somewhat less.

Male. Front tibiae not conspicuously widened apically; front thighs strongly tuberculate, smooth area large, highly polished, without visible striae and without posterior limiting ridge.

Length 2 to 2.25 mm.

Described from 2 ♂s, 1 ♀, submitted by Mr. F. S. Carr who took them at Medicine Hat, Alberta, February 27th, 1926. The male type is in my own collection, male and female paratypes in Mr. Carr's collection. This interesting species by its narrow form, parallel sided thorax which is as long as wide, and coarsely punctured abdomen, is related to *erraticum* and *impeditum*, between which it may be placed. It may at once be separated from either by the large completely nonstriate polished area of the femoral swelling.

Apion cyanitinctum n. sp.

Moderately elongate, wider behind, the form and size very nearly as in *puritanum;* color black, with deep blue elytra; pubescence whitish, very fine, sparse and inconspicuous. Beak (♂) shorter than the head and thorax, gradually tapering to apex (as viewed from above) with a strong abrupt dilatation over the antennal fovea; in the ♀ as long as the head and thorax, cylindrical and only very feebly dilated over the antennal insertion; surface punctate and finely sculptured throughout, except toward the apex in the male, which is smoother and shining; front canaliculose; eyes not prominent. Antennae inserted at basal two-fifths of beak, rather stout, basal joint as long as the next two (♂) or a little longer (♀), third joint not (♀) or barely (♂) reaching the eye. Prothorax as long as or slightly longer than wide, subconical, base a little wider than the apex, sides nearly straight and convergent from the base, no appreciable apical or basal constriction, surface alutacious and dull, rather sparsely punctate, the punctures separated by their own diameters or a little more, a distinct elongate basal fovea. Elytra one-half longer than wide, humeri moderate, sides nearly straight and divergent to the middle; intervals flat, nearly or quite twice as wide as the striae, sparsely, finely and feebly punctulate; sutural angles not differing in the sexes. Metasternum and sides of ventral segments closely rather coarsely punctate, the latter more sparsely punctured medially. Legs moderate, all tibiae without apical spur or mucro in the male; claws nearly simple. Length (exclusive of beak) 2.5-2.7 mm.

Described from three examples (1 ♂, 2 ♀s) collected by Mr. Norman Criddle at Aweme, Manitoba. The male is taken as the type and bears date "6-VII-1922." According to Mr. Criddle it occurs on Astragalus.

This species by its dark blue elytra is in striking contrast with all other North American forms. My first specimen was received from Mr. Criddle fifteen years or more ago—it bears date "V-23-09"—but I have persistently refrained from describing it, suspecting it might be an importation from Europe where there are numerous blue species of this genus. Comparison has been made with a dozen or so of these without finding any that matched our Manitoban form, and I am therefore risking the possible creation of a synonym by describing it. Because of the nearly simple claws *cyanitinctum* must be referred to Group II of my Revision—Trans. Am. Ent. Soc. 1899.

DESCRIPTIONS OF NINE NEW SPECIES OF MELANOTRICHUS REUTER FROM NORTH AMERICA (HEMIPTERA, MIRIDAE).*

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For some time the writer has noticed in the genus *Orthotylus* Fieb., that the *flavosparsus* group of species present characters worthy of generic recognition, namely: dorsum bearing two types of pubescence, simple hairs intermixed with recumbent, scale-like pubescence; left genital clasper represented by a simple curved hook, not bifurcate into two nearly equal parts as in typical *Orthotylus*. The genus *Orthotylus* Fieb. (type *nassatus* Fab.) is characterized by bearing only simple pubescence, while the left genital clasper is bifurcate near base, thus divided into two prominent arms (see figures 83-87, Hemiptera Connecticut, 1923). These two groups of species differ more widely than many recognized genera in the family Miridae, hence the writer proposes to recognize them as valid genera.

Reuter (1875) erected the subgenus *Melanotrichus* to include *flavosparsus* Sahlb. and certain other species, for which Kirkaldy (1904) designated *flavosparsus* Sahlb. as type. *Trichorhinus* Fieber (1858), type *ericetorum* Fall., is not congeneric with *flavosparsus* Sahlb. *Pachylops* Fieber (1861), type *chloropterus* Fieber, not Kirsch.=*bicolor* D. & S., now appears to be synonymous with *Hypsitylus* Fieber (1861). I therefore use *Melanotrichus* Reuter as the correct generic name to use for this group of species.

Besides the new species here described, the genus *Melanotrichus* Reuter includes the following species from the Nearctic region: *althaeae* Hussey, *catulus* Van D., *coagulatus* Uhler, *concolor* Kirsch., *ferox* Van D., *flavosparsus* Sahlb., *inconspicuus* Uhler, *mistus* Kngt., *tibialis* Van D., *viridicatus* Uhler, and probably *senectus* Van D.

Iowa.

Melanotrichus viridicatus (Uhler).

Orthotylus viridicatus Uhler, Hemip. Colo., p. 48, 1895.

The writer found the type of *viridicatus* Uhler in the U. S. National Museum collection, bearing the characteristic label in Uhler's hand writing. The locality label reads "Colo. 158" and below that is another slip bearing the number "76." No doubt this number was for reference purposes when the species from Colorado were being sorted out for naming by Uhler. The type is a female specimen with broken antennae, but the color characters and pubescence enable me to locate the species among the material I have for study.

Mr. Van Duzee has given a redescription of *viridicatus* Uhler in his monograph of the genus *Orthotylus* (Univ. Calif. Publ., Div. Ent. Tech. Bul., i, p. 241, 1916). In describing the male genitalia he states: "Dextral hook of the male genitalia long protruding, terete, its end rounded and not at all narrowed." Such would seem to fit the description of *althaeae* Hussey better than any species I have seen. I have taken a good series of *althaeae* Hussey, Aug. 11, 1925, Fort Garland, Colorado, on a plant of the hollyhock family; also have found it abundant on *Althae* sp., Sept. 1925, at Ames, Iowa.

For comparison with other species here described, I give the following redescription of *viridicatus* (Uhler).

*—Contribution from the Department of Zoology and Entomology, Iowa State College, Ames,

♂. Length 3.7 mm., width 1.3 mm. Head: width .74., vertex .37 mm. Rostrum, length 1.06 mm., reaching to middle of hind coxae. Antennae: segment I, length .38 mm.; II, 1.3 mm., distinctly greater than width of pronotum at base; III, 1.03 mm.; IV, .35 mm.; black pubescent, greenish yellow, last two segments more fuscous. Pronotum: length .53 mm., width at base 1.02 mm.

Color deep blue-green, head, calli and scutellum yellowish green; membrane uniformly blackish, veins pale to greenish, cubitus fuscous except apically where it becomes pale. Dorsum clothed with prone, black, scale-like deciduous pubescence, and intermixed with fine, long, erect pale hairs; venter pale pubescent, legs and antennae black pubescent. Distinguished from related forms by structure of right genital clasper which is ligulate, somewhat broader apically, the apical third curved inward to median line, its apex abruptly acute, darker colored, and pointing cephalad, but not as a long spine like *incurvus*.

♀. Length 3.9 mm., width 1.5 mm. Head: width .78 mm., vertex .43 mm. Antennae: segment I, length .33 mm; II, 1 mm. Pronotum: length .56 mm., width at base 1.05 mm. More robust than the male but very similar in pubescence and coloration.

Plesiotypes: ♂ Aug. 12, 1925, Wolf Creek Pass, alt. 9,000 ft. Colorado (H. H. Knight); ♀ July 20-25, 1920, Yellowstone National Park, Wyoming (A. A. Nichol). Other specimens are at hand labeled "Colo." bearing C. F. Baker lot numbers.

Melanotrichus incurvus n. sp.

Allied to *viridicatus* Uhler, but smaller, second antennal segment shorter, not equal to width of pronotum at base; right genital clasper with the apical one-third recurved inwardly, slender and acuminate.

♂. Length 3.2 mm., width 1.2 mm. Head: width .68 mm., vertex .37 mm. Rostrum, length .99 mm., nearly attaining posterior margins of hind coxae. Antennae: segment I, length .32 mm.; II, .84 mm.; III, .61 mm.; IV, .26 mm. Pronotum: length .47 mm., width at base .95 mm.

Coloration and pubescence nearly as in *viridicatus;* yellowish green to blue green; membrane uniformly blackish, veins pale to greenish, cubitus fuscous, pale to whitish apically. Dorsum clothed with prone, black, scale-like deciduous pubescence, and intermixed with fine, long, erect pale to yellowish hairs; venter pale pubescent, legs and antennae black pubescent. Genitalia distinctive, right clasper ligulate, apical one-third recurved inwardly, slender and acuminate; dorsal margin of genital segment expanded posteriorly into a thin chitinous plate, about as wide as long, directed obliquely distad toward the left side, while a slender spine-like process arises at the base of this plate on the right side and points directly distad, above but in the same plane with the basal third of right genital clasper.

♀. Length 3.3 mm., width 1.3 mm. Head: width .71 mm., vertex .38 mm. Antennae: segment I, length .26 mm.; II, .77 mm.; III, .59 mm.; IV, .25 mm. Pronotum: length .53 mm., width at base 1.03 mm. Very similar to the male in pubescence and coloration, but membrane more whitish on middle, bordering apex of cuneus, and on basal half of larger areole.

Holotype: ♂ June 12, 1900, Fort Collins, Colorado; author's collection.

Allotype: ♀ June 7, topotypic.

Paratypes: 2♂ 2♀, "Colo." 2♀ Aug. 1, 1914, Hermit Rim road, Grand Canyon, Arizona (J. C. Bradley). ♀ July 12, 1919, Jemez Springs, alt. 6,400 ft., New Mexico (J. Woodgate). ♀ June-Aug., 1907, Cheyenne, Wyoming (Fanny T. Hartman).

Melanotrichus chelifer n. sp.

Allied to *incurvus*, antennal segment II not or scarcely equal to basal width of pronotum; differs in the shorter rostrum and in structure of the right genital clasper which is bifurcate or cheliform on apex.

♂. Length 3.4 mm., width 1.2 mm. Head: width .71 mm., vertex .33 mm. Rostrum, length .77 mm., scarcely attaining hind margins of middle coxae. Antennae: segment I, length .29 mm.; II, .98 mm.; III, broken. Pronotum: length .53 mm., width at base 1.03 mm.

Pubescence and coloration very similar to *incurvus*. Genital claspers distinctive, apical half of right clasper bifurcate, very much resembling the chela of a crayfish.

♀. Length 3.4 mm., width 1.3 mm. Head: width .70 mm., vertex .37 mm. Antennae: segment I, length .26 mm.; II, .84 mm. Pronotum: length .50 mm., width at base .93 mm. Very similar to the male in coloration and pubescence; membrane paler, fuscous along cubitus and in a ray-like cloud behind the areoles.

Holotype: ♂ July 12, 1917, Mesilla Park, New Mexico (H. H. Knight); author's collection.

Allotype: ♀, taken with the type.

Paratypes: 18♂ ♀, taken with the types. ARIZONA—♂ "Ariz. 2123" (Baker). COLORADO—♂ June 19, 1898, Fort Collins (E. D. Ball). SOUTH DAKOTA—♂ June 1, 1921, Capa; ♂ June 23, 1923, Philip (H. C. Severin).

Melanotrichus brevirostris n. sp.

Allied to *chelifer* but larger and darker green in color; differs in the shorter rostrum, while length of second antennal segment (♂) is greater than basal width of pronotum.

♂. Length 4.5 mm., width 1.5 mm. Head: width .77 mm., vertex .38 mm. Rostrum, length .83 mm., only attaining hind margin of sternum. Antennae: segment I, length .37 mm.; II, 1.27 mm.; III, 1.11 mm.; IV, .34 mm.; dark green to fuscous. Pronotum: length 1.18 mm.

Color dark blue-green; membrane dark fuscous, paler on basal half of larger areole and spot bordering apex of cuneus, veins green, cubitus fuscous except under apex of larger areole where it is pale. Pubescence similar to that of *chelifer*. Genitalia very similar to *chelifer*, scarcely to be separated on that basis, although he dorsal claw of he bifurcate portion curves more strongly upward.

♀. Length 3.7 mm., width 1.5 mm. Head: width .77 mm., vertex .415 mm. Antennae: segment I, length .29 mm.; II, 1 mm.; III, .85 mm.; IV, .32 mm. More robust and hemelytra shorter than in the male, but pubescence and coloration very similar.

Holotype: ♂ Sept. 9, 1925, Bear River City, Utah (G. F. Knowlton); author's collection.

Allotype: same data as type.

Paratype: ♂, taken with the types.

Melanotrichus nicholi n. sp.

Allied to *chelifer* and *brevirostris*, but distinguished by the longer rostrum, paler color, and very distinct genital characters.

♂. Length 4 mm., width 1.4 mm. Head: width .77 mm., vertex .355 mm. Rostrum, length 1.18 mm., attaining posterior margins of hind coxae. Antennae: segment I, length .29 mm.; II, 1.23 mm.; III, .96 mm.; IV, broken. Pronotum: length .66 mm., width at base 1.15 mm.

Pubescence very similar to that of *chelifer*, but coloration more of a pale green; membrane fuscous, veins green. Genital structures distinctive; right clasper extending straight behind, at middle or a trifle beyond there arises a vertical spine which in height about equals thickness of clasper, just behind this the apical portion of clasper tapers gradually to an acuminate point, the apex of which is curved sharply mesad; above the base of right clasper the segment wall projects posteriorly as a thin, chitinous, slightly upcurved prong.

♀. Length 3.8 mm., width 1.5 mm. Head: width .83 mm., vertex .44 mm. Antennae: segment I, length .35 mm.; II, 1.27 mm.; III, .98 mm.; IV, .40 mm. Pronotum: length .62 mm., width at base 1.21 mm. More robust than the male but very similar in pubescence and coloration. Membrane fuscous, veins distinctly green, scarcely paler apically, the larger areole more greenish than fuscous.

Holotype: ♂ May 17, 1926, Tempe, Arizona (A. A. Nichol); author's collection.

Allotype: same data as the type.

Named in honor of the collector, Mr. Andrew A. Nichol, whose interest and skill in collecting has revealed a large number of new Hemiptera from Arizona.

Melanotrichus atricornis n. sp.

Allied to *inconspicuus* Uhler, but distinguished by the black antennae and genital claspers; differs from *tibialis* Van D. in the green tibiae and genital claspers.

♂. Length 3.9 mm., width 1.25 mm. Head: width .78 mm., vertex .43 mm.; ridge at base of vertex and the frons set with prominent black bristles; frons prominent above base of tylus, shape of head much as in *Ilnacora*. Rostrum, length .89 mm., scarcely attaining hind margins of intermediate coxae, greenish, apical segment black. Antennae: segment I, length .43 mm.; II, 1.36 mm.; III, 1.15 mm.; IV, .41 mm.; black, sometimes brownish black apically. Pronotum: length .5 mm., width at base .98 mm.; disk nearly flat, basal margin transverse, but rounding to basal angles.

General coloration pale bluish-green, antennae and apex of rostrum black; tarsi fuscous apically, claws black. Membrane uniformly fuscous, veins pale to green. Dorsum clothed with prominent black, bristle-like hairs, intermixed with prostrate, black, elongate scale-like pubescence; ventral surface of body with pale pubescence, femora bearing black hairs, tibial spines and pubescence black. Genital claspers distinctive; left clasper ligulate, curved along the ventral segment wall, slightly broader apically, incurved, dorsal margin terminating in a

small claw-like hook; right clasper folded upon itself before middle, a flattened process arising on inner margin of middle, projecting posteriorly and bearing five or six small teeth on its distal margin, apical one-third of clasper acuminate, bearing several small teeth on its inner margin.

♀. Length 3.9 mm., width 1.5 mm. Head: width .84 mm., vertex .5 mm. Antennae: segment I, length .41 mm.; II, 1.18 mm.; III, .86 mm.; IV, .42 mm. Pronotum: length .52 mm., width at base 1.05 mm.

Very similar to the male in pubescence and coloration. In some specimens the membrane is abbreviated, not or scarcely covering apex of abdomen.

Holotype: ♂ May 28, 1926, Lillooet, British Columbia (J. McDunnough); Canadian National collection.

Allotype: ♀, taken with the type; author's collection.

Paratypes: 13 ♂ ♀, taken with the types on sage brush (*Artemisia* sp.).

Melanotrichus wileyae n. sp.

Allied to *coagulatus* Uhler, but larger, second antennal segment much longer, dorsum more thickly and evenly clothed with silvery scale-like pubescence and intermixed with pale simple pubescence.

♂. Length 4.3 mm., width 1.5 mm. Head: width .89 mm., vertex .33 mm.; eyes larger and more prominent than in *coagulatus*. Rostrum, length 1.3 mm., just attaining posterior margins of mesocoxae. Antennae: segment I, length .35 mm.; II, 1.7 mm.; III, broken; pale, pale pubescent. Pronotum: length .58 mm., width at base 1.15 mm.

Dorsum thickly clothed with silvery scale-like pubescence and intermixed with pale simple pubescent hairs, a few dusky hairs appear on clavus and corium only; the silvery, scale-like pubescence also present on sides of thorax and venter; legs pale pubescent, spinules pale. General coloration pale to pale green, hemelytra more green; membrane pale, outer margin beyond cuneus dusky, veins green.

Holotype: ♂ Aug. 8, 1921, Salt Wash Creek, Emery County, Utah (Grace O. Wiley); author's collection.

Melanotrichus leviculus n. sp.

Distinguished by the small size, uniformly greenish color and pale dusky membrane.

♀. Length 2.9 mm., width 1.15 mm. Head: width .65 mm., vertex .37 mm.; frons rather full and evenly rounded. Rostrum, length .86 mm., scarcely attaining posterior margins of hind coxae. Antennae: segment I, length .21 mm.; II, .71 mm.; III, .86 mm.; IV, .47 mm.; greenish yellow, last two segments dusky. Pronotum: length .36 mm., width at base .92 mm.

Color uniformly greenish or yellowish green, apex of rostrum and the claws black. Clothed with pale to dusky brown simple pubescence and rather sparsely intermixed on dorsum with fine, silvery, sericeous pubescence; tibial spines pale yellowish, concolorous with the tibiae. Membrane uniformly pale dusky, veins green, not or very little surpassing apex of abdomen.

♂. Length 2.9 mm., width 1 mm. Head: width .61 mm., vertex .32 mm. Antennae: segment I, length .21 mm.; II, .83 mm.; III, .71 mm.; IV, .31 mm. Pronotum: length .33 mm., width at base .80 mm. Very similar to the female in

pubescence and coloration, but hemelytra longer, base of cuneus about even with tip of abdomen. Genital claspers small but distinctive, left clasper forming a moon-shaped semicircle as viewed from behind, while right clasper is in the form of a simple hook.

Holotype: ♀, Sea Cliff, New York (O. Heidmann); Cornell University collection.

Allotype: topotypic. 2 ♀, taken with the types on *Suaeda maritima* which is doubtless the host plant.

Melanotrichus mimus n. sp.

Allied to *vigilax* Van D., but differs in the longer rostrum and blue-green areoles of the membrane.

♂. Length 3.6 mm., width 1.2 mm. Head: width .72 mm., vertex .20 mm.; eyes large and prominent, vertex distinctly concave, the poorly defined carina merely indicated by the posterior margin of the concave area. Rostrum, length .89 mm., attaining posterior margin of sternum. Antennae: segment I, length .29 mm., rather thick; II, 1.09 mm., cylindrical, not as thick as segment I; III, .89 mm.; IV, .24 mm.; dusky green, segment I more greenish. Pronotum: length .52 mm., width at base .95 mm.

Color green to bluish green; membrane pale dusky, veins and areoles blue-green. Dorsum clothed with simple, soft yellowish pubescence, and intermixed with much finer, appressed, sericeous silvery pubescence. Genital claspers small, left clasper a simple curved hook, gradually tapering from middle to an acuminate point. Right clasper somewhat thicker, curved, bluntly acuminate on apex.

♀. Length 3.4 mm., width 1.26 mm. Head: width .74 mm., vertex .355 mm. Rostrum, length .95 mm., reaching slightly behind posterior margin of sternum. Antennae: segment I, length .26 mm.; II, 1.06 mm.; III, .62 mm.; IV, broken. Pronotum: length .54 mm., width at base 1.11 mm. More robust than the male but very similar in coloration and pubescence.

Holotype: ♂ April 19, Tucson, Arizona (A. A. Nichol); author's collection.

Allotype: ♀ May 4, 1925, Santa Catalina Mts., alt. 2700 ft., Arizona (A. A. Nichol).

Paratypes: ♂, taken with the type. 3 ♀, taken with the allotype.

Melanotrichus albocostatus (Van. D.).

A good series of this species has been examined, as follows: BRITISH COLUMBIA—♂ ♀ May 28, 1926, Lillooet (J. McDunnough), taken on "yellow crucifer." 2 ♂ June 4, 1921, Cranbrook (C. Garrett). NEVADA—♂ ♀ May 18, 1924, Pyramid Lake (E. R. Hall). COLORADO—2 ♂ June 17, 1918, Denver (L. O. Jackson).

BOOK REVIEW

Butterflies of California. By Dr. John Adams Comstock, 334 pp. 63 Colored Plates and 78 text Illustrations, 1927. Published by the Author, 501 Edwards-Wildey Bldg., Los Angeles, Calif.

For some time entomologists, and particularly lepidopterists, have been awaiting with great expectancy the appearance of the above volume. Advance copies of some of the plates, which had been distributed to certain institutions and specialists, had aroused considerable enthusiasm and served to whet one's appetite for the complete work. This now lies before us and it may be said, without hesitation, to more than fulfil our expectations.

As the author states in the preface, the present work is the result of over twenty-five years of study of the North American Rhopalocera, and its aim is to present a concise guide by means of which the nature lover may identify all the species of butterflies occurring within California without being troubled with too many technical details. To accomplish this end satisfactorily copious illustrations in color-photography have been necessary; practically every one of the 236 species involved is depicted in both sexes and in upper and underside figures and, in addition, the various races, forms, and aberrations are also shown, the quality of these illustrations being remarkably good and fully equalling anything of the kind that has heretofore been produced on this continent.

What, however, most delights the heart of the specialist is to find that the correct scientific names have been applied to the species; in Wright's "Butterflies of the West Coast," a somewhat similar production, many of the identifications were hopelessly incorrect and the sexes had furthermore been frequently confused; for this, however, the author was not entirely to blame as at the time the nomenclature of North American Diurnals was much confused. Dr. Comstock has avoided all these nomenclaturial pitfalls and has embodied in his work the results of specialists' studies during the past decade so that in consequence the names employed may be considered as accurate as present knowledge permits. The text includes much valuable information regarding distribution and early stages of the various species and is followed by a complete synonymic list of Californian Diurnals as well as by short chapters on methods of capture etc. and gross anatomy of butterflies; in conclusion the author presents a reprint of all his various papers containing original descriptions of butterflies.

The work is indispensable to all entomologists and especially, of course, to lepidopterists and the author is to be heartily congratulated on the production of a volume which will rank along with Edwards' and Scudder's works among the classics of North American lepidopterous literature. J. McDunnough.

Mailed Monday, June 20th, 1927.

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